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## The Origin of Twenty-Eight Mansions In Astronomy

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### INTRODUCTION

From the time of high antiquity Chinese people have practiced agriculture. To these primitive folks an elementary knowledge of astronomy is indispensable; being without a calendar, they had to watch stars in the night in order to determine the proper time for planting of crops, repairing of buildings, etc. The starry night of northwest China, which is the cradle of the Chinese civilization, also favors such a procedure. For an illustration we may cite portions of two Odes from the "Book of Poetry," which is a collection of folklore of early Chow dynasty, said to have been edited by Confucius himself. In the Odes of Pin stand these verses:<sup>1</sup>

"In the seventh month, the Fire star passes the Meridian,  
In the 9th month, clothes are given out,  
In the days of first month, the wind blows cold,  
In the days of second, the air is cold;—  
Without the clothes and garments of hair,  
How could we get to the end of the year?  
In the days of third month, they take plough in hand,  
In the days of fourth, they take their way to the field,  
Along with my wife and children,  
I carry food to them in those southlying acres,  
The surveyor of the field comes, and is glad."

Again in the Odes of Yung come these verses:<sup>2</sup>

"When Ting culminated at night fall,  
He began to build the palace at Tsoo.  
Determining its aspects by means of the sun,  
He built the mansion at Tsoo."

Now "Fire star" is the early Chinese designation for the red star Antares, in the constellation Scorpio; and "Ting" signifies Pegasus square, which culminated at night fall in the autumn months during Chow dynasty. In the "Book of Poetry," which has been universally acknowledged by the Chinese scholars as the most authentic of the Chinese classics, besides the mentioning of Fire star and Ting, the following stars or asterisms also appeared: Mau or Pleiades, Pi or Taurus, Ki or Sagittarius, Chien Nieou or Aquila, Tse-Niu or Lyra, and Tsan or the belt of Orion. These constitute the nucleus of the 28 Mansions

of China. A complete list of 28 Mansions, however, did not appear until a much later date, about 200-500 B.C., in any of the four following books: Li-ki, Er-yah, Wei-nan-tze, and Lu-shi-chun-chiu.

The 28 Mansions or Siu or Chinese astronomy were made known to the western world in the eighteenth century by the Catholic Father, P. Gaubil, whose book "Chronologie Chinoise" was well known to astronomers of that time. In 1807, Colebrook with the help of Hindu Pundits, identified the principal stars or Jogotaras of 27 or 28 Nakshatras of India, the longitudes and latitudes of these principal stars being given in several Indian works, the Surya and Brahma Siddhantas, the Siddhanta Siromani, and the Grahalagava.<sup>8</sup> A comparison of Chinese Siu with the Hindu Nakshatra makes it plain that they are common in origin. For the last hundred years the question whether the 28 Mansions were originated in China or in India has been a mooted problem. Two French scholars, J. R. Biot in the middle of the 19th century, and Leopold de Saussure in the first part of the 20th, Gustav Schlegel of Holland, and the late Professor S. Shinzo of Japan were all in favor of Chinese origin; while the German scholar, L. Weber, the American Indianist, W. D. Whitney of Yale University, the Rev. J. Edkins of *China Review*, and the author of "Hindu Astronomy," W. Brenand, all held contrary views. With the end of the Second World War and with the reopening of the Burma Road and coastwise communications, Sino-Hindustanian relations should be much closer than heretofore, commercially as well as culturally. It is interesting, therefore, to bring up a question which reminds one of intellectual cooperation and borrowings of these two neighboring peoples millenniums ago.

#### A. COMMON ORIGIN OF HINDU NAKSHATRA AND CHINESE SIU

The common origin of Hindu Nakshatra and Chinese Siu is not doubted. A glance at the tables I and II will show that in 9 of the 28 Mansions, *i.e.*, Kio, Ti, Tche, Py, Leou, Wei, Mao, Tseu, and Tchin, the Jogotaras of the Hindu system are identical with the controlling stars of the Chinese system, while in 11 of the rest, even though the determining or controlling stars are not identical, they belong to the same Western constellation. Only eight asterisms have Jogotaras of Hindu system and controlling stars of Chinese system in entirely different constellations. Of these eight it is interesting to note that for the asterism Niu or "woman," the Hindus used  $\alpha$  Aquilae instead of  $\epsilon$  Aquarii, and for the asterism Nieou or "ox," the Hindus used  $\alpha$  Lyrae instead of  $\beta$  Capricorni. Now in China  $\alpha$  Lyrae is called Tse-Niu, or "a weaving woman" and  $\alpha$  Aquilae is called Chien-Nieou, or "leading an ox to sacrifice." It is most probable that in ancient times the Chinese, like the Hindus, also used  $\alpha$  Aquilae and  $\alpha$  Lyrae as leading stars in their 28 Mansions instead of  $\epsilon$  Aquarii and  $\beta$  Capricorni which are comparatively inconspicuous stars. This was made evident

by the fact that the latter two stars were not cited in the "Book of Poetry," while mentions were made of the former in the same book.<sup>4</sup> In Li-ki as well as in Erh-yah, Wei-nan-tze, and Lu-shi-chun-chiu, Niu and Nieou were already used in the place of Tse-Niu and Chien-Nieou. The change, therefore, must have been made in the intervening years. With the advance of knowledge of observation, such alteration is but natural, for both Vega and Altair, are too far from the ecliptic, and therefore not convenient for the location of the moon or the sun. In "Uranographie Chinoise," Gustav Schlegel stated that in the planisphere of Denderah in the temple of Hother, Egypt, both the "woman" and "a man accompanied by a cow" were represented in the zodiac of Capricornus, and in the 3rd decan of the Hindu sphere of Aben-Ezra, a fish and a woman weaving cloth were depicted.<sup>5</sup> All in all, the agreement of Hindu Nakshatra and Chinese Siu is so remarkable that we must conclude that they had the same origin. Kumagusu Minakata, a Japanese scholar, maintained that "the Chinese records of the typical con-

TABLE I  
THE TWENTY-EIGHT MANSIONS OF CHINA

No.	Chinese Siu	Meaning	No. of Stars	Greek name	Controlling Star		
					Mag.	R.A. (1900) h m s	Decl. (1900) ° ' "
1	Kio	Horn	2	$\alpha$ Virgo	0.9	13 19 55	-10 38 22
2	Kang	Neck	4	$\kappa$ Virgo	4.2	14 07 34	- 9 48 30
3	Ti	Breast	4	$\alpha^3$ Libra	2.8	14 45 21	-15 37 35
4	Fang	Room	4	$\pi$ Scorpio	2.9	15 52 48	-25 49 35
5	Sin	Heart	3	$\sigma$ Scorpio	3.0	16 15 07	-25 21 10
6	Quei	Tail	9	$\mu$ Scorpio	3.1	16 45 06	-37 52 33
7	Ki	Winnowing tray	4	$\gamma$ Sagittarius	2.8	17 59 23	-30 25 31
8	Teou	Bushel	6	$\phi$ Sagittarius	3.2	18 39 25	-27 05 37
9	Neou	Ox	6	$\beta$ Capricornus	3.2	20 15 24	-15 05 50
10	Niu	Woman	4	$\epsilon$ Aquarius	3.8	20 42 16	- 9 51 43
11	Hiu	Emptiness	2	$\beta$ Aquarius	2.9	21 26 18	- 6 00 40
12	Koey	Covered house	3	$\alpha$ Aquarius	3.9	22 00 39	- 0 48 21
13	Tche	House	2	$\alpha$ Pegasus	2.6	22 59 47	+14 40 02
14	Py	Wall	2	$\gamma$ Pegasus	2.9	0 08 05	+14 37 39
15	Koei	Sandal	16	$\eta$ Andromeda	4.2	0 42 02	+23 43 23
16	Leou	Basket for harvest	3	$\beta$ Aries	2.7	1 49 07	+20 19 09
17	Wei	Stomach	3	$\delta$ Aries	3.1	2 44 06	+26 50 54
18	Mao	Setting sun	7	$\eta$ Taurus	2.8	3 41 32	+23 47 45
19	Pi	Net	8	$\epsilon$ Taurus	3.6	4 22 47	+18 57 31
20	Tseu	Lips	3	$\lambda'$ Orion	3.4	5 29 38	+ 9 52 02
21	Tsan	3 stars	10	$\zeta$ Orion	1.7	5 35 43	- 1 59 44
22	Tsing	Well	8	$\mu$ Gemini	3.0	6 16 55	+22 33 54
23	Koei	Ghost	4	$\theta$ Cancer	5.8	8 25 54	+18 25 57
24	Lieou	Willow	8	$\delta$ Hydra	4.2	8 32 22	+ 6 03 09
25	Sing	Neck of a bird	7	$\alpha$ Hydra	2.0	9 22 40	- 8 13 30
26	Tchang	Bill of a bird	6	$\mu$ Hydra	4.0	10 21 15	-16 19 33
27	Yi	Wings of a bird	22	$\alpha$ Crater	4.2	10 54 54	-17 45 59
28	Tchin	Carriage	4	$\gamma$ Corvus	2.6	12 10 40	-16 59 12

N. B. The names of controlling stars are taken from G. Schlegel's "Uranographie Chinoise." The right ascensions and declinations are taken from L. Boss, "Catalogue of 6188 stars for the epoch 1900," Carnegie Institution, Washington, D. C.

stellations dated further back than the epoch of their intercourse with the Indians. The Indian constellations . . . are essentially of Brahmanical type and thus proclaim their priority in existence to the event of the Buddhist mission to China, which marks the era of the mutual

TABLE II  
THE HINDU NAKSHATRAS

No.	Nakshatra	Meaning	No. of stars in Nakshatra	Jogotaras			
				Greek Name	Mag.	R.A. (1900) h m s	Decl. (1900) ° ' "
1	Aswini	A horse's head	3	β Aries	2.7	1 49 07	+20 19 09
2	Bharani	Youi	3	41 Aries	3.5	2 44 06	+26 50 54
3	Kritics	A razor	6	η Taurus	2.8	3 41 32	+23 47 45
4	Rohini	A wheel carriage	5	α Taurus	0.9	4 30 11	+16 18 30
5	Mriga	The head of an antelope	3	λ' Orion	3.4	5 29 38	+ 9 52 02
6	Ardra	A gem	1	α Orion	1.0	5 49 45	+ 7 23 18
7	Punarvasu	A house	4	β Gemini	1.1	7 39 12	+28 16 04
8	Pushya	An arrow	3	δ Cancer	4.1	8 39 00	+18 31 19
9	Aslesha	A wheel	5	ε Hydra	3.4	8 41 29	+ 6 47 09
10	Magha	Another house	5	α Leo	1.2	10 03 03	+12 27 21
11	Purva Phalguni	A bedstead	2	δ Leo	2.5	11 08 47	+21 04 18
12	Uttra Phalguni	Another bedstead	2	β Leo	2.2	11 43 58	+15 07 52
13	Hasta	A hand	5	γ Corvus	2.6	12 10 40	−16 59 12
14	Chitra	A pearl	1	α Virgo	0.9	13 19 55	−10 38 22
15	Swati	A piece of coral	1	α Bootes	0.0	14 11 06	+19 42 10
16	Visakha	A festoon of leaves	4	α Libra	2.8	14 45 21	−15 37 35
17	Anuradha	An obligation to the gods	4	δ Scorpio	2.3	15 54 25	−22 20 14
18	Jyeshtha	A rich earring	3	α Scorpio	0.8	16 23 17	−26 12 37
19	Mula	The tail of a fierce lion	11	λ Scorpio	1.5	17 26 49	−37 01 58
20	Purva-shadha	A couch	2	δ Sagittarius	2.7	18 14 36	−29 52 14
21	Uttar-shadha	The tooth of a wanton elephant, near which is the kernel of the sringataca nut	2	τ Sagittarius	3.3	19 00 42	−27 49 00
22	Abhijit	A grain of rye	3	α Lyra	0.0	18 33 33	+38 23 05
23	Sravana	The three footed step of Vishnu	3	α Aquila	0.6	19 45 54	+ 8 36 15
24	Dhanishta	A tabor	4	α Delphini	3.9	20 35 00	+15 33 33
25	Satabhisha	A circular jewel	100	λ Aquarius	3.8	22 47 24	− 8 06 43
26	Purva Bhadra-pada	A two-faced image	2	α Pegasus	2.6	22 59 47	+14 40 01
27	Uttara Bhadra-pada	Another couch	2	γ Pegasus	2.9	0 08 05	+14 37 39
28	Revati	A smaller sort of tabor	12	ζ Piscium	5.5	1 08 30	+ 7 02 47

N.B. The Hindu star names and their Greek identities are taken from W. Brenand "Hindu Astronomy."

acquaintance of two nations.”<sup>6</sup> Hence he argued that though the two systems are practically coincident, they had separate origins. Thanks to the researches of sinologues for the last 20 or 30 years, we now know that the intercourse between Chinese and Hindus far preceded in order of time the Buddhist mission in the later Han dynasty (67 A.D.), and astronomical evidence may antedate the sinological discoveries still further.<sup>7</sup>

#### B. WHERE WAS THE SYSTEM OF 28 MANSIONS ORIGINATED?

If we admit that the Chinese *Siu* and the Hindu *Nakshatra* had the same origin, then the question arises as to where was this *Siu* or *Nakshatra* invented. Since 1839, when a series of articles by J. B. Biot began to appear in *Le Journal des Savants*, and when L. Ideler published his book “Über die Zeitrechnung der Chinesen,” a controversy waged hot between the Indianists on the one hand and the Chinophiles on the other. As is usually the case in such a strife, much heat was evolved but little light was shown at first. There are three hypotheses in connection with the communal origin of the 28 Mansions: (1) The system was originated in China, (2) it was invented in India, and (3) both the Chinese and Hindus borrowed it from Babylonia or some other country in western Asia. Each hypothesis has its staunch supporters. The French savant, Leopold de Saussure, made an admirable résumé of the pros and cons of the arguments advanced by different authors in his first two papers on Chinese astronomy, published in T’oung-Pao.<sup>8</sup> The difficulty of settling the question lies in the fact that no authentic record of Chinese history existed earlier than Chow dynasty (1122-246 B.C.); the recent unearthing of divination bones and tortoise shells of the later Shang dynasty at An-Yang, dated Chinese history back 300-400 years earlier to 1400 B.C. But beyond that, Chinese history has to depend upon the conjectures and interpretations of later writers, who endeavored to give meanings to passages contained in the old classics, which had reference to doings of early Emperors like Yao and Shun (*circa* 2400 B.C.). The situation in India is not much better. The first evidence of great antiquity of Hindu astronomy was made known to the western world by the publication of certain astronomical tables in the “Memoir of the French Academy of Sciences” in 1687. In the later part of the 18th century, a Frenchman, M. Bailly, the author of “*Traité de l’Astronomie Indienne*,” maintained that a general conjunction of the sun, moon, and planets was observed by the Hindu astronomers in the year 3102 B.C. This statement was much controverted at that time, and opinion was advanced that the epoch of 3102 B.C. was adopted by the Hindus at a comparatively recent date, only from calculation. No less an authority than the famous Laplace denied its authenticity.<sup>9</sup>

Bearing these facts in mind, we will see that much of the hot discussion on this controversial topic is not fruitful, for many authors based

their conclusions on wrong premises. Both L. Weber and W. H. Whitney believed that no authentic Chinese document existed previous to the third century B.C., for the first Emperor of Tsin dynasty (246-210 B.C.) burned every fragment of the written records then extant. This, of course, is not strictly true. Besides, the burning of the books was not all inclusive, those on medicine and divination were conspicuously exempted. On the other hand, the Chinophiles, especially J. B. Biot and Gustav Schlegel, put too much faith in the authenticity of all Chinese written records. Even Leopold de Saussure<sup>10</sup> was rather credulous at times. According to the recent researches of Chinese scholars, the book Hsia-Siao-Cheng and the text of Yao-Tien in the "Book of History" (Shu-King) were not written at the mythical age of Emperor Yao and Hsia dynasty (2400-1800 B.C.), but were probably composed in the early Chow dynasty.<sup>11</sup> The books Chow-Li, as well as Chow-Pi, in which the principle of determining the date of solstices by means of measuring the shadow of a gnomon was mentioned, could not be the work of Chow-Kung, the brother of the first Emperor of Chow dynasty. The Chow-Li was written in the period of 500-300 B.C. and Chow-Pi not until the later Han dynasty.<sup>12</sup>

In discussing the system of 28 Mansions of China and India, three cardinal facts must be firmly grasped: (a) While Babylonians, Egyptians, and Greeks observed the solar position in the zodiac by watching heliacal rising of stars, the Chinese and Hindus, from the earliest times, determined the sidereal place of the sun by noting that of full moon. The advantage of this latter procedure is obvious. This fact was clearly stated by de Saussure. He said: "When the moon is full she is exactly diametrically opposite the sun. As the sun comes back every year, in the same month, into the same constellation (then invisible) it follows that the full moon happens every year in the same month in the opposite constellation. . . The observations of moon's 'full' . . . does not necessitate the use of any artificial point of reference, and the precision of its result is much superior to that which might proceed from the observation of the star's rising. These risings vary with the same slowness as the annual course of the sun, namely, one degree per day. Besides, the mists of the horizon and the variation in the atmospheric state seldom allow us to distinguish the stars when their height is small, so that it is often difficult to fix, within 10 days, the one whose heliacal rising immediately precedes dawn, or the one whose acronychal rising has taken place opposite the setting sun.

"Such is not the case when observing the sidereal place of the moon, if one knows exactly the time of her 'full.' In observing the aspect of the disc one could no doubt commit a great error: for it is impossible at first sight to discern the 'full' within a day. But some ancient Chinese traditions show us they could appreciate the exact 'full' within a quarter of a day, a decided proof that they made use, for this determination,



of the simultaneousness of the moon's rising with sunset. . . During the primitive period, when the year's course was still only indicated by the sidereal points of reference, this process of observation permitted the fixing of an annual date and the rectifying of the lunar year. It suggested the opportunity of adding an intercalary month. In China, it was Kio which served this end. That star, of first magnitude, marked in the firmament the entrance of the Spring Palace. The full moon which showed to the right of Kio was the 12th (or 13th) of the year and the one which showed to left of Kio was the first of the new year."<sup>13</sup>

According to Professor P. C. Senguta of Calcutta University, during the Brahman period all the lunar months were named according to the Nakshatra in which the full moon happened to occur. When the full moon took place in the Nakshatra "Phalguna" the very next day shall be the new year's day and the first month of the year is called "Phalguna." In still earlier times, spring began one day after the moon in Chaitra, which is equivalent to Chinese Mansion Kio.<sup>14</sup> This similarity of reckoning the new year in India and in China again amply proves the identity of the two systems.

(b) The system of 28 Mansions in China is primarily devised to regulate an agricultural calendar, solar-lunar in character. From the earliest times of the Shang and Chow dynasties, as was made evident by the discoveries in An-Yang and by the various Odes in "Book of Poetry," raising of farm crops had been the main care of most of the population, while hunting and pasturing were mere subsidiary professions. It is doubtful whether the Chinese ever had been nomadic; for no stars or constellations were named after a ram or a goat, and the early Chinese seemed never to have acquired the habit of milk drinking. To these primitive farmers of ancient times, the knowledge of coming of spring or growing season was a vital necessity; especially in north-west China, where winter is long and rigorous. During the second to third millennium before the Christian era, the acronychal rising of the star Antares ( $\alpha$  Scorpii), the Chinese Fire star, or Sin, about the time of spring equinox, was made a great occasion. A special officer was created to watch the appearance of this star on the eastern horizon. According to Se-Ma Tsien<sup>15</sup> the downfall of Emperor Sao-Haw (*circa* 2598 B.C.) was brought about by famines, calamities, and invasions of barbarians, mainly due to the confusion of seasons; and his successor, Tsan-Shu, restored the order by establishing two officers; one to observe the culmination of stars on the meridian, and the other to watch the acronychal rising of Fire star or Antares. In Tso-Chuan, it was stated, "the Fire star first appeared in third month during Hsia dynasty, fourth month in Shang dynasty and fifth month in Chow dynasty."<sup>16</sup> All these go to prove that the ceremony of observing the first acronychal rising of Fire star in China is of long standing, and it served

an urgent need of a farming population.

(c) The Chinese new year, from time immemorial began not from vernal equinox but from a point called Li-Chun lying just midway between the winter solstice and vernal equinox.<sup>17</sup> Se-Ma Tsien was again our authority on this statement.<sup>18</sup> The choice of Li-Chun as the beginning of the year is of great significance astronomically. To the early Chinese, three constellations in the sky are in a rank by themselves. These are Scorpio, Orion, and Ursa Major. They are called the Ta-Chin or great rulers of the sky. In Kung-Yung-Chuan, it is stated, "What is Ta-Chin? Great Fire star is Ta-Chin, Orion is Ta-Chin, and the North Pole is also Ta-Chin."<sup>19</sup> Hence "North Pole" is also known as North-Chin. Professor Shinzo interpreted "North Pole" as nothing but the seven principal stars of the constellation Ursa Major.<sup>20</sup> In ancient times the body of the Great Bear was much nearer the north pole than it is now, and the tail of the Great Bear seemed to rotate around the north pole like the hand of the clock. According to Se-Ma Tsien, the seasons of the year could be determined by the position of the handle of the "Great Dipper." There is a clear statement of this method of determining the season in the writings of Hoh-Kwan-Tze: "When the tail of the Bear points to the east (at night fall) it is spring to all the world. When the tail of the Bear points to the south it is summer to all the world. When the tail of the Bear points to the west, it is autumn to all the world. When the tail of the Bear points to the north, it is winter to all the world."<sup>21</sup> Now if we extend the handle of this "Northern Bushel" in approximately the same direction for 30°, we will come to a very bright star Arcturus ( $\alpha$  Boötis) or Ta-Kio (great Horn) and if we go 30° still farther we come to another first magnitude star Spica ( $\alpha$  Virginis) or Kio (Horn), which is the controlling star of the first Mansion of the Chinese system and supposed to be the horn of the dragon. It is most likely that Ta-Kio formerly occupied a Mansion in Chinese Siu as it still does in Hindu Nakshatra. For the same reason as Chien-Nieou and Tse-Niu yielded their places to Nieou and Niu, so did Ta-Kio yield its place to Kio. Thus Se-Ma Tsien said, "The handle of the 'Great Dipper' brought forth the head of the Dragon" which is the beginning of the palace of spring. It is significant that about 3000 B.C. the full moon occurred in the Mansion of Kio about the period Li-Chun.

If we keep these three cardinal facts in mind, we will be in a better position to appreciate the arguments of different writers, and to evaluate their claims. Both L. Weber<sup>22</sup> and W. H. Whitney<sup>23</sup> believed that the Hindu Nakshatra was earlier than the Chinese Siu by more than one thousand years, on account of the fact that the Hindu system began with the Nakshatra Mao, or Pleiades, while the Chinese Siu commenced with Kio. Kingsmill quoted Weber in saying that the Chinese asterism must be of late introduction, not earlier than the second or third cen-



ture B.C. from the fact that the list as usually presented begins with Spica.<sup>24</sup> The miscalculation lies in the fact that both Weber and Whitney assumed that the ancient Chinese began their calendar with the vernal equinox and not with Li-Chun as was shown above. On the other hand, the Chinophile, Gustav Schlegel, assuming that the Chinese system was formed when Antares, the controlling star of Sin, had its heliacal rising on vernal equinox; and Spica, the controlling star of Kio, had its heliacal rising on Li-Chun, came to the conclusion of 14,000 B.C. as the age of the origin of the Chinese 28 Mansions.<sup>25</sup>

If we disregard these extravagant claims and misguided arguments, we can then come face to face with plain facts. The most valid arguments in favor of Chinese origin are advanced by de Saussure and Shinzo. They are the following: (a) The gradual formation of the Chinese system from the two asterisms, Sin (Scorpio) and Tsan (Orion) and the four cardinal culminating stars of Yao-Tien, to the complete list mentioned in Li-Ki and Erh-Yah, can be traced in several stages; while in India, the system was ready made from start, and so far we do not have any inkling of the process of its formation.<sup>26</sup> (b) Biot made the discovery that the controlling stars of Chinese 28 Mansions came in couples located diametrically opposite each other in meridian, and based on an equatorial system. De Saussure later elaborated this scheme. The first couple chosen was the two Grand Rulers or "Ta-Chins" of the sky: Sin and Tsan. This fact was quoted in Tso-Chuan, and must have come from a source of great antiquity.<sup>27</sup> The Hindus, even though they used practically an identical system, seemed never to have noticed this coupling effect. (c) In Vedic astronomy, the Hindu new year commenced with Phalguna. But Professor P. C. Senguta stated that in ancient times in India "Spring began one day after the moon in Chaitra"<sup>28</sup>; from that fact he concludes that the point of summer solstice must have been near  $\delta$  Leonis about the period 3100 B.C. From Senguta's statement it is clear that the ancient Hindu new year, like the Chinese, should come in the month when the full moon entered the Mansion Kio.<sup>29</sup> But as mentioned above, the Chinese 28 Mansions commenced with Kio, because the ancient Chinese regard the "Great Dipper" as the arbiter of seasons, and the handle of the "Dipper" happened to point to Mansion Kio. In India the Nakshatras do not seem to bear any relation with the "Great Dipper." This fact seems to confirm the contention of Professor Shinzo that the system of 28 Mansions must have been given rise in a region where the constellation Ursa Major had been taken as the standard of time keeper.

Besides the three points mentioned above, there are still two other facts which, in the opinion of the present writer, also merit attention: (d) While ancient Hindus may have excelled the Chinese of the same period in theoretical calculations in the realm of astronomy, they were not as good in making observations. The ancient Chinese observations

on solar eclipses, sunspots, and comets were well known. A catalogue of 120 stars with polar distances and declinations was compiled by two astronomers, Kan and Si. Basing on these data, Professor Shinzo and his colleagues computed the date of cataloging to be 350 B.C., or nearly 200 years earlier than the famous star catalog of Hipparchus and Ptolemy. Even the Indianists and Hindu scholars admit that the ancient Hindus were not at all diligent in making astronomical observations. According to W. Brenand, "The Hindus, unlike the ancient Chinese, had not the ambition of making a catalogue of all stars which were visible to them. They had a more important object in view, namely, the study of the motions of the sun, the moon, and the planets and other astronomical phenomena, primarily for the purpose of computing time and of constructing and perfecting their calendars. Such an object, they knew, could not be materially advanced by ascertaining merely the positions of stars fixed beyond or outside the course of the moving celestial bodies; and they accordingly confined their attention to those stars which lay in moon's path, immediately north or south of the Ecliptic."<sup>30</sup>

Dr. Bhutan Dutta, lecturer in mathematics at Calcutta University, in an article on "Vedic mathematics" also said: "They (the Hindu astronomers) noted very few stars lying outside that belt (Ecliptic). Probably they did not search for others."<sup>31</sup> The fact that the ancient Hindus did not discard such stars of high latitude and great declination, as Vega and Arcturus, from their list of Jogotaras shows that they were not very careful even in observing the stars along the moon's track, for it is not possible for either the moon or the planets to approach anywhere near one of these stars. Besides, without long years of assiduous gazing of sky, it is most improbable that a system of 28 Mansions could be devised. So the natural conclusion would be that the whole system of Nakshatra was imported in a body.

(e) Many authors, including Ideler, the Rev. John Chalmers, and Kingsmill, criticized the Chinese system because of its asymmetry. The 28 Mansions were divided into four quarters of 7 Mansions each; these were called by Se-Ma Tsien, Spring, Summer, Autumn, and Winter Palaces. They vary greatly in length: Spring Palace (east) occupies  $70^{\circ} 50'$ , Winter Palace (north)  $101^{\circ} 10'$ , Autumn Palace (west)  $75^{\circ} 40'$ , and Summer Palace (south)  $112^{\circ} 20'$ . The angular value of each Mansion also varies greatly from more than  $30^{\circ}$  to less than a degree. Such a heterogeneous grouping of stars would outrage the aesthetic sense of an artist or the taste for precision of a mathematician. But the ancient Chinese, being highly practical in taste, did not bother with fine adjustment of symmetry, as long as the scheme worked to foretell the coming and going of seasons. Indeed, it is the very non-uniformity of the length of four Palaces that proves the indigeneity of the system of 28 Mansions to China.

As referred to above, the 28 Mansions system in China is nothing but an agricultural calendar, by which the primitive farmers can date their ploughing of land, planting and transplanting of seeds and seedlings, clearing of weeds, harvesting of crops, etc. The division of a year into four seasons in China is very natural; spring for planting, summer for growing, autumn for harvesting, and winter for resting. Northwest China, however, has a continental climate; winters are apt to be severe and summers rather torrid, and both are of long duration, with short spring and autumn in between. In India the year is divided either into three seasons or into six,<sup>32</sup> but not into four, and yet the Nakshatras are divided into four groupings of seven each,<sup>33</sup> which could not serve any useful purpose. It seems, therefore, the exotic nature of 28 Mansions to India is undeniable.

When two great ancient civilizations, like those of China and India meet, the flow of intellectual current cannot be a one way traffic. There are ample proofs that the ancient Chinese had borrowed abundantly from India even before the Buddhist mission to China in the later Han dynasty. In astronomy the cycle of Jupiter in China was distinctly foreign in origin. The twelve names of the cycles first appeared in Erh-Yah and Wei-Nan-Tze; later Se-Ma Tsien employed them in his "Historical Record" to arrange the years of cycles of sixty. The names of the cycle are words of two and three syllables, and singularly exotic in character. They are now rarely used. For the last two thousand years the Chinese scholars from Kuo-Poh, the commentator of Erh-Yah, to Mr. Liang Chi-Chao of recent past, endeavored to discern their meaning and to decipher their origin, but all in vain. The cycle starts with Shitika. The Rev. John Chalmers suspected the term Shitika to be the corrupted version of the Hindu word for Jupiter, "Vrishaspati"; while the Rev. Mr. Edkins, who believed Chinese obtained the 28 Mansions from Babylonia, identified it with the Babylonian word for Jupiter, "Dibbat Gutter."<sup>34</sup> The identification of a single name will not, however, solve this enigma. It is the nature of the cycle that is of importance. The cycle of Vrishaspati of 12 years as described by Parasara, was quoted by Varaha-Mihira:<sup>35</sup> "The name of the year is determined from the Nakshatra in which Vrishaspati rises and sets (heliacally), and they follow in order of lunar month. The years beginning with Cartic commences with Nakshatra Critica, and to each year there appertain two Nakshatras, except the 5th, 11th, and 12 years, to each of which appertain three Nakshatras." W. Brenand, the author of "Hindu Astronomy," also quoted the opinion of Davis to the effect that "The year Cartic is always placed the first of 12 Vrishaspati years, it may be inferred that there was a time when the Hindu solar year, as well as the Vrishaspati cycle of 12, began with the sun's arrival in or near the Nakshatra Cartic."

If we will compare these statements with those passages in "Wei-

Nan-Tze" and Se-Ma Tsien's "Historical Record," referring to the Chinese cycle of Jupiter, it is at once plain that the latter is but a reproduction of the cycle of Vrishaspati. Some of the Chinese names in the cycle like "Shitika," and "Ta-un-hin," still retain almost the exact transliteration of the corresponding Hindu Nakshatras "Critica" and "Dhanishtha" as shown in Table III.

W. Brenand also mentioned that "Now an astronomical work was known amongst the Hindus under the name of Brihaspati or Vrishaspati Siddhanta. . . That the name of the planet should have been associated with that of the sage Vrishaspati, would seem to imply a connection of this astronomical work with the Buddhist religion, and that in Siddhanta of Vrishaspati would be found rules which regulated the observance of Buddhist faith." It seems probable that the cycle of Jupiter was imported from India to China along with Buddhism, and this must have occurred in the period 300-200 B.C., when the cycle began to make its appearance in Chinese books.

TABLE III  
A COMPARISON OF CHINESE CYCLE OF JUPITER  
WITH HINDU CYCLE OF VRISHASPATI

Hindu Year Name	Nakshatra	Chinese Year Name
Cartic	Critica, Rohini	Shitika
Agrahayan	Mrigaseras, Ardra	Shan-a
Baush	Punarvasu, Pushya	Chisu
Magh	Aslesha, Magha	Tafongloh
Phalgun	Purva Phalguni, Uttara-Phalguni, Hasta	Tunsang
Chaitr	Chitra, Swati	Hiphap
Vaisach	Visacha, Anuradha	Jundhan
Jaiscth	Jyeshtha, Mula	Tsongo
Ashar	Purna-Ashara, Uttara-Ashara	Immao
Sravan	Sravana, Dhaninshtha	Ta-un-hin
Bhadr	Satababisha, Purna-Bhadrapada, Uttara-Bhadrapada	Kwantun
Aswin	Revati, Aswini, Bhorani	Chifangonk

C. THE ANTIQUITY OF CHINESE ASTRONOMY

Probably no exact date could be given to the origin of the system of 28 Mansions for the simple reason that the system was formed gradually, and did not arise *en bloc*. An estimate of age, however, can be made of the various asterisms or controlling stars which came to be known to the Chinese and later to be embodied into the system. According to Tung Tso-ping, the Chinese writings engraved on the divination bones and tortoise shells found in An-Yang excavation, three star names have already been deciphered: "Fire star," "Bird star," and "A New Great star," all in the age of Emperor Wu-ting (1329-1291 B.C.). Other star names or asterisms might be present but have not been deciphered so far. It may be inferred from the name of "Bird star" and "Fire star" that the scheme of dividing the heavens along equatorial circle into four figures of Blue Dragon (east), Red Bird (south), White Tiger (west),

and Black Tortoise (north) was already known at that time. This is about the only information we can derive from the archeological findings of An-Yang at present. There are, however, several indirect methods which may reveal the antiquity of the Chinese astronomy if not the system of 28 Mansions.

(a) *The position of sun and moon at solstices and equinoxes.* In Se-Ma Tsien's "Historical Record," it was definitely stated: "At the winter solstice the sun resides at Hiu."<sup>36</sup> This statement agrees well with Yao-Tien, according to which the equinoxes were in Taurus (Pleiades) and Scorpio, and solstices in Leo and Aquarius in the time of Yao. No doubt there was a tradition to this effect at the time when Shu-King (The Book of History) was compiled, for the author, knowing nothing of the precession of the equinoxes, could not have adjusted them to the time of which he was writing."<sup>37</sup> If we take the controlling star of Hiu as  $\beta$  Aquarii as given in Table I, the statement must be referred to a period 3800 years ago. The Hindus also had a tradition that formerly at winter solstice the sun had been in the middle of Aslesha, and at summer solstice in the beginning of Dhanishtha.<sup>37</sup> The fact that the 28 Mansions commenced with Kio in China probably indicates that the full moon was in the same Siu at Li-Chun or the commencement of spring at that time, which would date the origin of the system 1100 years still earlier, to the year 3000 B.C.

(b) *The location of celestial North Pole.* It is a well-known fact that due to the precession of equinoxes Polaris has not been always the north polar star to the inhabitants of the earth. During Se-Ma Tsien's time,  $\beta$  Ursae Minoris instead of  $\alpha$  Ursae Minoris was the pole star, as can be verified by his statement in "Historical Record," and 2000 years earlier during the period when the Egyptians built the great pyramid of Cheops, it had been  $\alpha$  Draconis.<sup>39</sup> But the early Chinese for some unknown reason did not use  $\alpha$  Draconis, instead they employed two small stars in the neighborhood of  $\alpha$  Draconis; "Tai-Yi" and "Tien-Yi." The names of these stars indicated that they were the north pole itself or "sovereign of the sky." The identification of these stars is not certain, they were mentioned first in "Sing-Kin" by Astronomer Si compiled about 400-300 B.C. The name Tien-Yi also occurred in Se-Ma Tsien's "Historical Record." Gustav Schlegel took them to be the star 30671, and  $\kappa$  Draconis; while de Saussure identified Tien-Yi to be  $\iota$  Draconis.<sup>40</sup> The scope of this paper will not allow us to discuss the correctness of these identifications. Suffice it to say here that, according to the Chinese tradition of the former position of pole star, the antiquity of Chinese astronomy must go back to some time about 3000 years B.C.

(c) *The location of celestial equator.* With the passing of years the celestial equator moves with the celestial pole. J. B. Biot and de Saussure had hotly contended that the Chinese 28 Mansions were originally lying along the celestial equator, and that they were not lunar zodiacs,

as some writers called them, because they were not a belt of asterisms along the ecliptic. The truth of their contention can be envisaged if we take a glance at Schlegel's chart of 28 Mansions. The belt of these Mansions makes an angle of about  $20^\circ$  with the ecliptic.<sup>41</sup> This belt must have coincided approximately with the celestial equator of the period when the system of 28 Mansions had its origin. De Saussure believed it to be about 2500 B.C. The author of this paper has counted on a celestial globe the number of Mansions lying along the celestial equator at different periods, and found the following facts: At present there are eleven Mansions which are lying partly or wholly within a belt  $10^\circ$  on either side of the equator; at the beginning of Christian Era, 14 Mansions; between the period 2300-4300 B.C., 18 to 20 Mansions; at 6600 B.C., 15 Mansions; and at 8800 B.C., only 6 Mansions. The probability, therefore, is in favor of some date between 2300 and 4500 B.C.

(d) *The constellation Great Bear with nine principal stars.* The constellation Ursa Major was taken by the ancient Chinese as a standard clock to mark the time of the year; the tail of the "Great Bear" served as the pointer. There is a passage in Wei-Nan-Tze, which like the paragraph of Hoh-Kwan-Tze, quoted above, illustrates how the months and seasons can be told by noting the direction of the pointer of the clock. Wei-Nan-Tze mentioned the name of the pointer, a star called Chao-Yao, or  $\gamma$  Bootis. Thus it says, "When Chao-Yao points (at night fall) to Yin (N  $60^\circ$  E), it is the first month in spring. . . . When Chao-Yao points to Mao (N  $90^\circ$  E) it is second month in spring, etc." Nowadays, the star Chao-Yao is not considered as a part of the "Northern Bushel." But there is a tradition mentioned in "Sing-Kin" and several other books of Taoist origin, that the constellation "Northern Bushel" originally consisted of nine principal star, two of them having been lost sight of in antiquity. These two stars apparently were alluded to  $\lambda$  and  $\gamma$  Bootis, which are located along the general direction of the handle of the "Northern Bushel." Now if the passage of Wei-Nan-Tze quoted above should represent the real fact,  $\gamma$  Bootis must then have been a circumpolar star, which appeared above the horizon all the year round. This would be the case only during the period 1500-4200 B.C.

(e) *The two stars Vega and Altair.* There are many legendary tales spun around this couple of stars which we need not go into. The interesting thing about them is that while the Hindus still kept them as Jogotaras in their Nakshatra, the Chinese displaced them with Nieou and Niu. More significant, however, is the fact that the order of the two asterisms has been reversed in the Chinese system as compared with the Hindu system. In the Hindu system Vega or Tse-Niu precedes Altair or Chien-Nieou, but in Chinese system Nieou goes before Niu. Now, judging from Chinese terms employed for these stars, Nieou should be the substitute of Chien-Nieou and Niu for Tse-Niu. But then



why this curious mixup? The explanation lies in the fact that, with the advance of time, the precession of equinoxes can bring about the change of right ascension of stars; and the magnitude of the change varies somewhat with different stars according to their position in relation to the ecliptic and the equinoctial colures. Controlling stars or Jogotaras of neighboring asterisms with small difference in right ascension but with great difference in declination may in time exchange places in the order of enumeration. A well-known case occurred in the 13th century or Yuan dynasty in China, when the controlling star of Tsan,  $\delta$  Orionis, overtook that of the preceding Siu, Tseu,  $\lambda$  Orionis.<sup>42</sup> This caused some confusion, and in Ming dynasty a great dispute arose among the court astronomers as to which Siu, Tsan or Tseu, should take the precedence. The question was finally settled by changing the controlling star of Tsan from  $\delta$  Orionis to  $\xi$  Orionis, situated at the other end of the belt of Orion. Now exactly the same kind of inversion took place between the two bright stars Vega and Altair at about 3600 B.C. Se-Ma Tsien was unaware of this inversion of order, so he said in the "Historical Record," "Chien Nieou (now Nieou) is for sacrifice, farther north the Aquila; bright star in the center, the general; one each on its right and left, lieutenants. Then followed by Wu-Niu (now Niu) farther north, Tse-Niu who is a heavenly princess." We may, therefore, conclude from the facts stated above that when original arrangement was made more than 5000 years ago, Vega was still east of Altair in right ascension, hence the latter preceded the former. After 3000 B.C. the order was reversed. Ignorant of this fact, Se-Ma Tsien in enumerating the different Sius still mentioned them in the old order as was handed down traditionally. The Hindus, borrowing the system from China before Altair and Vega were substituted by Niu and Nieou, persisted in using them, but reversed their order. The Chinese, using the substitutes, Nieou and Niu which differ not much in declination, keep them in the old order.

(f) *Rain God Pi and Wind God Ki*. In the Chinese "Book of Poetry" there stand the following lines:<sup>43</sup>

There are the swine with their legs white,  
All wading through streams,  
The moon also in Hyades,  
Which will bring still greater rain.

So far no satisfactory explanation has been offered to elucidate why the moon in Hyades should forebode rain in China. Although many Chinese commentators of the classics had tried their wit in giving interpretations to this passage, none could stand any examination. In "Uranographie Chinoise," Gustav Schlegel offered an explanation which was on the right track to solve this puzzle. But owing to his bias toward high antiquity of the Chinese astronomy, he went amiss. He said "Ces pluies avaient lieu quand la lune entrait dans l'asterisme Py; mais

dans l'époque historique cette coïncidence des pluies avec la conjonction de la lune et de cet asterisme n'avait plus lieu; car, à l'époque du Chouking, la nouvelle lune entrait dans les Hyades au printemps et pas en automne, époque des pluies torrentielles."<sup>44</sup> Kingsmill was also greatly puzzled by it. He said, "The connection of the Hyades with rain was early believed by the Chinese, the "Book of Poetry" tells us that when the moon passes the Pi there will be heavy rain, a statement, however, difficult to reconcile with the observations."<sup>45</sup> The Rev. J. Edkins poses the question: "Why does the constellation Pi, the Hyades, the rainy stars, indicate rain?"<sup>46</sup> That Hyades should be looked upon as rain God by both Chinese and Western people, like Babylonians and Greeks, is certainly remarkable. The reason why the Chinese should regard moon in the Mansion Pi as a forerunner for rain, however, can be explained, if we denote the moon as full moon, which is what it should mean. About the period 4000 B.C. the full moon entered the asterism Pi by the middle of August when rainy weather prevails in northwest China. The asterism Ki was usually taken as the Wind God, this was alluded to in the Chinese classic Shu-King (Book of History). This fact can be explained on the same ground, *i.e.*, at the period 4000 B.C., the full moon entered the asterism Ki at vernal equinox, when the wind velocity usually attains its maximum in northwest China.

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